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| 10/763,712 | 01/21/2004 | Harrison F. Dillon | H2042101-CIP | 6531 |

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| EXAMINER | |
|---|---|
| SCHLAPKOHL, WALTER | |
| **ART UNIT** | **PAPER NUMBER** |
| 1636 | |

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**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

| Office Action Summary | Application No. | Applicant(s) | |
|---|---|---|---|
| | 10/763,712 | DILLON, HARRISON F. | |
| | Examiner | Art Unit | |
| | Walter Schlapkohl | 1636 | MW |

*-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --*

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

1)☒ Responsive to communication(s) filed on *19 October 2006 and 23 February 2007*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

4)☒ Claim(s) *1,2,7-9,11-24,27-39 and 41* is/are pending in the application.

4a) Of the above claim(s) *29-39* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,2,7-9,11-24,27-39 and 41* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

**Application Papers**

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *21 January 2004* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

## DETAILED ACTION

Receipt is acknowledged of the papers filed 10/19/2006 and 2/23/2007 in which claims 1, 8-9, 11-12, 17, 27 and 41 were amended, and claims 3-6, 10, 25-26 and 40 were cancelled. Claims 1-2, 7-9, 11-24, 27-39 and 41 are pending. Claims 29-39 are withdrawn. Claims 1-2, 7-9, 11-24, 27-28 and 41 are under examination in the instant Office action.

Any rejection of record not recited herein is hereby withdrawn.

### *Election/Restrictions*

This application contains claims drawn to an invention nonelected with traverse in reply filed 10/19/2006. A complete reply to the final rejection must include cancellation of nonelected claims or other appropriate action (37 CFR 1.144). See MPEP § 821.01.

### *Specification*

Examiner acknowledges Applicant's amendment of 10/19/2006 in which Applicant deleted the hyperlink present at page 34, paragraph 124, line 15. However, the disclosure is objected to because it contains other embedded hyperlinks and/or other forms

of browser-executable code at, for example, page 5, paragraph 25, line 18; page 35, paragraph 126, line 8; and page 39, paragraph 133, lines 12 and 14. Applicant is required to delete the embedded hyperlinks and/or other forms of browser-executable code. See MPEP § 608.01. Deletion of the browser-executable code, i.e., "http://" or "ftp://" would be remedial.

The amendment filed 10/19/2006 is objected to under 35 U.S.C. 132(a) because it introduces new matter into the disclosure. 35 U.S.C. 132(a) states that no amendment shall introduce new matter into the disclosure of the invention. The added material which is not supported by the original disclosure is as follows: replacement of the genome.jgi.psf.org/chlre1/chlre1.home.html website with the phrase "in databases maintained by the Joint Genome Institute, Walnut Creek, CA" at page 34, paragraph 124.

The amendment filed 2/23/2007 is also objected to under 35 U.S.C. 132(a) because it introduces new matter into the disclosure. Specifically, Applicant has deleted a portion of paragraph 129, all of Tables 1-4, as well as all of paragraph 172, yet references to the information present in Table 1 are present at, e.g., page 43, paragraph 138, lines 18-22 and

references to the information in Table 2 are present in the specification at, e.g., page 43, paragraph 139, lines 30-31. Upon entry of Applicant's amendment, these unsupported references alter the scope of written description support for Applicant's Examples 1 and 2, and therefore adds new matter into the disclosure.

Applicant is required to cancel the new matter in the reply to this Office Action.

***Sequence Compliance***

Receipt is acknowledged of the new paper and compact disc sequence listings submitted 10/19/2006. However, this application fails to comply with the requirements of 37 CFR 1.821 through 1.825 because Applicant has not filed a statement with the new paper copy and computer readable copy to indicate that the paper copy and computer readable copy are identical.

Appropriate correction is required.

***Priority***

Applicant's claim for the benefit of a prior-filed application under 35 U.S.C. 119(e) or under 35 U.S.C. 120, 121, or 365(c) is acknowledged. Applicant has not complied with one

or more conditions for receiving the benefit of an earlier filing date under 35 U.S.C. 120 as follows:

The later-filed application must be an application for a patent for an invention which is also disclosed in the prior application (the parent or original nonprovisional application or provisional application). The disclosure of the invention in the parent application and in the later-filed application must be sufficient to comply with the requirements of the first paragraph of 35 U.S.C. 112. See *Transco Products, Inc. v. Performance Contracting, Inc.*, 38 F.3d 551, 32 USPQ2d 1077 (Fed. Cir. 1994).

The disclosure of the prior-filed applications, Application Nos. 10/287,750 and 10/411,910 and 60/500,032 fail to provide adequate support or enablement in the manner provided by the first paragraph of 35 U.S.C. 112 for one or more claims of this application. Specifically, the prior-filed applications do not provide support for providing a mutagenized nucleic acid sequence derived from a first gene that encodes an iron-hydrogenase protein, wherein at least one amino acid from the segment $X^1X^2X^3FX^4X^5X^6GGVMEAAX^7R$ (SEQ ID NO:185) and at least one amino acid from the segment $ADX^8TIX^9EE$ (SEQ ID NO:186) are both substituted by a different amino acid in the iron-hydrogenase to generate the mutagenized nucleic acid sequence.

***Claim Objections***

The cancellation of claims 3, 5, 26 and 40 has rendered the objections to the claims moot. The amendments to claims 11, 17 and 41 are acknowledged and have been found remedial to overcome the objections of record.

***Claim Rejections - 35 USC § 112***

The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 1, 7 & 27, and therefore dependent claims 2, 8-9, 11-24, 28 & 41 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which Applicant regards as the invention. **These rejections are maintained in part. To the extent that these rejections are new, they have been necessitated by Applicant's amendment.**

Claim 1 recites "[a] method for engineering a cell to produce an increased amount of hydrogen comprising:

(a) providing a mutagenized nucleic acid sequence derived from a first gene that encodes an iron-hydrogenase protein, wherein at least one amino acid from the segment

$X^1X^2X^3FX^4X^5X^6GGVMEAAX^7R$ (SEQ ID NO:185) and at least one amino acid from the segment $ADX^8TIX^9EE$ (SEQ ID NO:186) are both substituted by a different amino acid in the iron-hydrogenase to generate the mutagenized nucleic acid sequence;

(b) transforming a cell with said mutagenized nucleic acid sequence, wherein the cell is selected from the group consisting of photosynthetic bacteria, bacteria and green algae; and

(c) screening or selecting the cell for an increased amount of hydrogen" in lines 1-12 (emphasis added). Claim 1 is vague and indefinite in that the metes and bounds of a "mutagenized nucleic acid sequence derived from a first gene that encodes an iron-hydrogenase protein, wherein at least one amino acid from the segment $X^1X^2X^3FX^4X^5X^6GGVMEAAX^7R$ (SEQ ID NO:185) and at least one amino acid from the segment $ADX^8TIX^9EE$ (SEQ ID NO:186) are both substituted by a different amino acid in the iron-hydrogenase to generate the mutagenized nucleic acid sequence" are unclear. Does Applicant intend such a method wherein a mutated iron-hydrogenase sequence is provided, and further wherein the $X^1X^2X^3FX^4X^5X^6GGVMEAAX^7R$ (SEQ ID NO:185) and $ADX^8TIX^9EE$ (SEQ ID NO:186) segments of the iron-hydrogenase each comprise at least one amino acid substitution; or does Applicant intend such a method wherein any sequence which can be derived from a gene that encodes an iron-hydrogenase, i.e., any nucleic acid

sequence at all, is provided as long as the sequence comprises at least one substitution to the $X^1X^2X^3FX^4X^5X^6GGVMEAAX^7R$ and $ADX^8TIX^9EE$ (SEQ ID NO:186) segments of the iron-hydrogenase?

Claim 7 recites "[t]he method of claim 5, wherein the mutagenized nucleic acid sequence is generated by site-directed mutagenesis" in lines 1-2 (emphasis added). Claim 7 is vague and indefinite in that the claim is dependent upon a cancelled claim.

Claim 27 recites "[t]he method of claim 1, further comprising repeating the steps of claim 1 using a second gene distinct from the first gene, wherein the second gene is selected from the group consisting of genes that encode ferredoxin, catalase, isoamylase, malate dehydrogenase, 14-3-3 protein, enolase, aldolase, ribosomal protein S8, ribosomal protein L17, ribosomal protein S18, ribosomal protein L37, ribosomal protein L12, ribosomal protein S15, and components of the photosystem I, photosystem II, light harvesting antenna and cytochrome b6-f complexes" in lines 1-7. Claim 27 is vague and indefinite in that it is unclear how the steps of claim 1 can be repeated for nucleic acids encoding proteins that do not comprise $X^1X^2X^3FX^4X^5X^6GGVMEAAX^7R$ and $ADX^8TIX^9EE$ segments.

*Response to Arguments*

Applicant argues that a nucleic acid generated by a mutagenesis technique is "derived from" a progenitor nuclei acid. Applicant further argues that the steps involved in the deriving are therefore any steps, including those involved in site-directed mutagenesis, random mutagenesis and gene reassembly which are well known in the art. Applicant further argues that the structural features/sequences indicative of a nucleic acid sequence which has been mutagenized are therefore "any sequence differences between the mutagenized sequence and the sequence it was derived from" (see page 16, last full paragraph of the Remarks filed 10/19/2006).

Applicant's arguments have been carefully considered and are respectfully found unpersuasive. Examiner agrees with Applicant insofar as one of ordinary skill in art would understand that a "mutagenized nucleic acid sequence derived from a first gene" can be derived in any manner of mutation and with the use of techniques and method steps which are well known in the art. Examiner further agrees with Applicant in that the structural difference indicative of such a mutagenized nucleic acid are therefore any sequence differences between the mutagenized nucleic acid sequence and the initial starting material, i.e., a gene that encodes an iron-hydrogenase.

However, the metes and bounds of the mutagenized nucleic acid of claim 1 are vague and indefinite because Applicant appears to be claiming any sequence which can be derived from a first gene that encodes an iron-hydrogenase, i.e. any nucleic acid sequence, but then seeking to limit the metes and bounds of such sequences by attempting to confine the genus of encompassed sequences to iron-hydrogenases which have at least one amino acid substitution in each of two iron-hydrogenase motifs. Therefore, it remains unclear whether Applicant intends to provide any nucleic acid sequence or a sequence in which some portion of the recited iron-hydrogenase segments are retained.

The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claim 27 is rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed

invention. **This is a new matter rejection. This is a new rejection necessitated by Applicant's amendment.**

The specification as originally filed does not provide support for the invention as now claimed: "[t]he method of claim 1, further comprising repeating the steps of claim 1 using a second gene distinct from the first gene, wherein the second gene is selected from the group consisting of genes that encode ferredoxin, catalase, isoamylase, malate dehydrogenase, 14-3-3 protein, enolase, aldolase, ribosomal protein S8, ribosomal protein L17, ribosomal protein S18, ribosomal protein L37, ribosomal protein L12, ribosomal protein S15, and components of the photosystem I, photosystem II, light harvesting antenna and cytochrome b6-f complexes." The specification does not provide sufficient blazemarks nor direction for the instant peptides encompassed by the above-mentioned limitation, as currently recited. Applicant has cited original claim 3 as support for the amendment to claim 27, but original claim 3 was drawn to a method for engineering a cell to produce an increased amount of hydrogen comprising three steps that included (a) providing a mutagenic nucleic acid sequence derived from a first gene that encodes a protein involved in a hydrogen production pathway, said nucleic acid selected from the group consisting of genes that encode ferredoxin, catalase, isoamylase, malate

dehydrogenase, 14-3-3 protein, enolase, aldolase, ribosomal protein S8, ribosomal protein L17, ribosomal protein S18, ribosomal protein L37, ribosomal protein L12, ribosomal protein S15, iron-hydrogenase, nickel-iron hydrogenase and components of the photosystem I, photosystem II, light harvesting antenna and cytochrome b6-f complexes; (b) transforming a cell with said mutagenized nucleic acid; and (c) screening or selecting the cell for an increased amount of hydrogen. Original claim 3 did not comprise support for a method for wherein the first gene was mutagenized iron-hydrogenase, the cells were transformed and then screened for increased hydrogen and further wherein such steps were repeated with a second gene. The instant claims now recite a limitation, which was not clearly disclosed in the specification as filed, and now changes the scope of the instant disclosure as filed. Such a limitation recited in the present claims, which did not appear in the specification as filed, introduces new concepts and violates the description requirement of the first paragraph of 35 U.S.C. 112.

***Claim Rejections - 35 USC § 112***

The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claims 1-2, 7-9, 11-24, 27-28 and 41 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. **This rejection is maintained for reasons of record but has been slightly modified in order to accommodate Applicant's amendment.**

Note: for purposes of this rejection only, Examiner has interpreted the amended claims to be drawn to methods of engineering a cell to produce increased amounts of hydrogen comprising:

(a) providing <u>any</u> nucleic acid sequence because any nucleic acid sequence can be derived from a first gene that encodes an iron-hydrogenase protein, wherein at least one amino acid from the segment $X^1X^2X^3FX^4X^5X^6GGVMEAAX^7R$ (SEQ ID NO:185) and at least one amino acid from the segment $ADX^8TIX^9EE$ (SEQ ID NO:186) are both substituted by a different amino acid in the iron-hydrogenase to generate the mutagenized nucleic acid sequence;

(b) transforming a cell with said mutagenized nucleic acid sequence, wherein the cell is selected from the group consisting of photosynthetic bacteria, bacteria and green algae; and

(c) screening or selecting the cell for an increased amount of hydrogen.

*Response to Arguments*

Applicant argues that Examiner's assertion that the claims are not restricted to any particular cell type or any particular gene, and thus the breadth of the claims is not in accord with the disclosure provided is not correct. Applicant further argues that multiple references are provided as to the types of cells that are known to produce hydrogen gas. Applicant further argues that the specification discloses numerous genes in addition to iron-hydrogenase which are involved in the hydrogen production pathways, including ferredoxin, catalase, isoamylase, malate dehydrogenase, 14-3-3 protein, enolase, aldolase, ribosomal protein S8, ribosomal protein L17, ribosomal protein S18, ribosomal protein L37, ribosomal protein L12, ribosomal protein S15, and components of the photosystem I, photosystem II, light harvesting antenna and cytochrome b6-f complexes.

Applicant's arguments have been carefully considered but are respectfully found unpersuasive for the following reasons.

Applicant's argument regarding the types of cells which can be used in Applicant's claimed method of engineering a cell to produce an increased amount of hydrogen is not persuasive for claims 18-19 which encompass the use of any cell. Applicant's argument with regard to the disclosure of numerous genes in the specification which are involved in hydrogen production pathways is not persuasive because 1) the instant claims encompass the use of any nucleic acid which can be derived from a first gene that encodes an iron-hydrogenase, i.e. the instant claims encompass the use of any mutagenized nucleic acid such that, upon transformation into a bacterium or a green algae species, it can be screened such that a cell with increased hydrogen production can be identified (see explanation above regarding the rejection of claim 1 under 35 U.S.C. 112, 2nd paragraph).

***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless -
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1-2, 12-13, 15-21 and 24 are rejected under 35 U.S.C. 102(b) as being anticipated by Ahmann (Combinatorial Mutagenesis of a Bidirectional Hydrogenase in Chlamydomonas reinhardtii, National Science Foundation Grant No. AWSFL008-DS3, 2002; cited previously) and as evidenced by Melis (*International Journal of Hydrogen Energy* **27**:1217-1228, 2002; cited previously). **This rejection is maintained for reasons of record but has been slightly modified in order to accommodate Applicant's amendment.**

Note: The exact date by which the Ahmann research proposal was available to the public is not clear. Applicant's IDS puts the date as 21 February 2002. The NSF website indicates the award was granted on 1 February 2002 (please see attached printout from the NSF website). In either case, the Ahmann document should have been available to the public more than one year before Applicant's effective filing date for the instant claims: 1/21/2004.

Examiner also wishes to emphasize that for purposes of this rejection only, Examiner has interpreted the claims to be drawn to methods of engineering a cell to produce increased amounts of hydrogen comprising:

(a) providing <u>any</u> nucleic acid sequence because any nucleic acid sequence can be derived from a first gene that encodes an

iron-hydrogenase protein, wherein at least one amino acid from the segment $X^1X^2X^3FX^4X^5X^6GGVMEAAX^7R$ (SEQ ID NO:185) and at least one amino acid from the segment $ADX^8TIX^9EE$ (SEQ ID NO:186) are both substituted by a different amino acid in the iron-hydrogenase to generate the mutagenized nucleic acid sequence;

(b) transforming a cell with said mutagenized nucleic acid sequence, wherein the cell is selected from the group consisting of photosynthetic bacteria, bacteria and green algae; and

(c) screening or selecting the cell for an increased amount of hydrogen.

Ahmann teaches methods for the combinatorial mutagenesis of iron-hydregonase genes obtained from a variety of different microorganisms and for the screening and selection of host cells comprising the resulting mutants for an increased ability to produce hydrogen (see entire document, especially "Statement of purpose section" of the Introduction). Regarding claim 2, Ahmann teaches such a method wherein a plurality of mutagenized nucleic acid sequences are used to transform a population of cells (ibid). Furthermore, Ahmann teaches such a method wherein the first gene encodes an iron-hydrogenase (ibid and Table 1). Regarding claim 12, Ahmann does not explicitly teach such a method wherein the mutagenized nucleic acid sequence encodes an iron-hydrogenase protein that functionally interacts with a

ferredoxin protein in the cell, but any mutant iron-hydrogenase which results in increase hydrogen production must inherently interact with a ferredoxin protein in order for the hydrogen to be produced as evidenced by Melis, who teaches that "[l]ight absorption by the photosynthetic apparatus is essential for the generation of molecular hydrogen, since light-energy facilitates the endergonic transport of elections to ferredoxin" and that "[p]hotosynthetic ferredoxin is the physiological electron donor to the [Fe]-hydrogenase and, therefore, links the soluble [Fe]-hydrogenase to the electron transport chain in the green alga chloroplast" (page 1218, first column, second full paragraph). Regarding claim 13, Ahmann teaches such a method wherein the screening or selecting occurs in the presence of oxygen at a concentration selected from the ranges comprising more than 0.5% (20-100%) (see section 5 of the Plan of Work). Regarding claim 15, Ahmann teaches such a method wherein the mutagenized nucleic acid sequence is generated by gene reassembly (see, e.g., section entitled "Combinatorial mutagenesis" of the Introduction). Regarding claims 16-17, Ahmann teaches such a method wherein the cell is of the genus *Chlamydomonas* (see, e.g., section 2 of the Plan of Work). Regarding claims 18-20, Ahmann teaches such a method wherein the sequences are retrieved from colonies showing increased hydrogen production, reshuffled

and screened (see, e.g., "Statement of purpose" section of Introduction). Regarding claim 21, Ahmann teaches such a method wherein the screening or selecting occurs by culturing cells in liquid growth media (see, e.g., section 5 of the Plan of Work). Regarding claim 24, Ahmann teaches such a method wherein the mutagenized nucleic acid sequence is operably linked to a promoter that is constitutively activated (see, e.g., Section 3 of the Plan of Work).

*Response to Arguments*

Applicant argues that claim 1 has been amended to include the element of providing a mutagenized nucleic acid sequence derived from a first gene that encodes an iron hydrogenase protein wherein at least one amino acid from the segment $X^1X^2X^3FX^4X^5X^6GGVMEAAX^7R$ and at least one amino acid from the segment $ADX^8TIX^9EE$ are both substituted by a different amino acid in the iron-hydrogenase to generate the mutagenized nucleic acid sequence. Applicant further argues that the Ahmann reference does not teach such elements either explicitly or inherently.

Applicant's arguments have been carefully considered but are respectfully found unpersuasive. As explained above, Examiner has interpreted claim 1 to encompass the use of any nucleic acid because any nucleic acid can be "derived" from a

first gene that encodes an iron-hydrogenase protein, wherein at least one amino acid from the segment $X^1X^2X^3FX^4X^5X^6GGVMEAAX^7R$ (SEQ ID NO:185) and at least one amino acid from the segment $ADX^8TIX^9EE$ (SEQ ID NO:186) are both substituted by a different amino acid in the iron-hydrogenase to generate the mutagenized nucleic acid sequence. Therefore, the claims as recited are not limited to nucleic acids encoding iron-hydrogenase polypeptides in which at least one amino acid from the segment $X^1X^2X^3FX^4X^5X^6GGVMEAAX^7R$ and at least one amino acid from the segment $ADX^8TIX^9EE$ are both substituted by a different amino acid in the iron-hydrogenase. However, Applicant's arguments with regard to inherency as it applies to the instant claims vis-à-vis the Ahmann reference are well taken, and Examiner wishes to clarify that the rejection of the claims as anticipated by the Ahmann reference are not predicated upon any inherency with regard to the nucleic acid sequences which encode the recited $X^1X^2X^3FX^4X^5X^6GGVMEAAX^7R$ and $ADX^8TIX^9EE$ segments.

***Conclusion***

No claim is allowed.

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL.** See MPEP § 706.07(a). Applicant is

reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Certain papers related to this application may be submitted to the Art Unit 1636 by facsimile transmission. The faxing of such papers must conform with the notices published in the Official Gazette, 1156 OG 61 (November 16, 1993) and 1157 OG 94 (December 28, 1993) (see 37 C.F.R. § 1.6(d)). The official fax telephone number for the Group is (571) 273-8300. Note: If Applicant *does* submit a paper by fax, the original signed copy should be retained by Applicant or Applicant's representative. NO DUPLICATE COPIES SHOULD BE SUBMITTED so as to avoid the processing of duplicate papers in the Office.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to (571) 272-0547.

Patent applicants with problems or questions regarding electronic images that can be viewed in the Patent Application Information Retrieval system (PAIR) can now contact the USPTO's Patent Electronic Business Center (Patent EBC) for assistance. Representatives are available to answer your questions daily from 6 am to midnight (EST). The toll free number is (866) 217-9197. When calling please have your application serial or patent number, the type of document you are having an image problem with, the number of pages and the specific nature of the problem. The Patent Electronic Business Center will notify applicants of the resolution of the problem within 5-7 business days. Applicants can also check PAIR to confirm that the problem has been corrected. The USPTO's Patent Electronic Business Center is a complete service center supporting all patent business on the Internet. The USPTO's PAIR system provides Internet-based access to patent applications to view the scanned images of their own application file folder(s) as well as general patent information available to the public.

For all other customer support, please call the USPTO Call Center (UCC) at (800) 786-9199.

Any inquiry concerning rejections or objections in this communication or earlier communications from the examiner should be directed to Walter Schlapkohl whose telephone number is (571) 272-4439. The examiner can normally be reached on Monday through Friday from 8:30 AM to 5:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Dr. Joseph Woitach can be reached at (571) 272-0739.

Walter A. Schlapkohl, Ph.D.
Patent Examiner
Art Unit 1636

May 17, 2007

DAVID GUZO
PRIMARY EXAMINER